PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: PHILIP L. COLE	Group Art Unit: 3663
Serial No.: 10/694,624	Examiner: Dudnikov, Vadim
Filed: October 27, 2003	Atty. Dkt. No.: COPL:002US
For: REMOTE SENSING DEVICE TO DETECT MATERIALS OF VARYING ATOMIC NUMBERS	Confirmation No. 2611

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March 16, 2009 — S. Scott Gordon
Date — S. Scott Gordon

APPEAL BRIEF

Commissioner for Patents
P. O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

Appellant submits this Appeal Brief to the Board of Patent Appeals and Interferences in response to the final Office Action dated October 14, 2008. Appellant filed a Notice of Appeal on January 14, 2009. Since the two-month deadline of March 14, 2009 falls on a weekend, the deadline for filing the Appeal

Brief is March 16, 2009. The small entity filing fee for the Appeal Brief is included. Should any additional fees under 37 C.F.R. §§ 1.16 to 1.21 be required for any reason relating to the enclosed material, or should an overpayment be included herein, the Commissioner is authorized to deduct or credit said fees from or to Fulbright & Jaworski L.L.P. Deposit Account No.: 50-1212/COPL:002US/10313650.

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I. REAL PARTY IN INTEREST

The real party in interest is the inventor, Philip L. Cole.

II. RELATED APPEALS AND INTERFERENCES

There are no related appeals or interferences.

III. STATUS OF THE CLAIMS

Claims 1-7 and 9-33 are pending. Claims 4, 5, and 10-27 are withdrawn from consideration. Claims 1-3, 6, 7, 9, and 28-33 are rejected. Claim 8 has been cancelled. The rejection of claims 1-3, 6, 7, 9, and 28-33 is being appealed.

IV. STATUS OF AMENDMENTS

No amendments are pending.

V. SUMMARY OF CLAIMED SUBJECT MATTER[1]

Independent claim 1 is directed to a method for identifying fissile material within in interrogated vessel. (para. [0029], as numbered in 2004/0114716). The method includes casting an incident photon beam from an electron beam accelerator through the interrogated vessel on the fissile material. (para. [0010]). The method also includes detecting an emerging photon beam within an energy range from about 1 MeV to about 50 MeV from the fissile material (Fig. 6; para. [0025]) with an array of fission-fragment detectors (Fig. 1, item 135; para. [0029]),

[1] Parentheticals citing to support in the specification for the claim language are exemplary and not meant to indicate that the specific citations are the only support in the specification for the claim language.

a first set of scintillator paddles (Fig. 1, item 140; para. [0029]), and a second set of scintillator paddles (Fig. 1, item 150; para. [0029]), wherein the array of fission-fragment detectors, the first set of scintillator paddles, and the second set of scintillator paddles (a) are arranged sequentially in a direct path of the emerging photon beam such that each receives the emerging photon beam (Fig. 4), and (b) are sensitive to different ranges of photon beam energy (para. [0024]). The method also includes obtaining a first signal from the array of fission-fragment detectors, a second signal from the first set of scintillator paddles, and a third signal from the second set of scintillator paddles, each signal indicative of photon yield within the different ranges of photon beam energy. (Fig. 5; paras. [0037], [0040]). Additionally, the method includes determining a photon energy regime of the emerging photon beam through identification of a drop in photon yield in at least one of the three signals, the determined photon energy regime identifying the fissile material within the interrogated vessel. (Fig. 6; para. [0042]).

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Claims 1-3, 6, -7, 9, and 28-33 stand rejected under 35 U.S.C. § 112, first paragraph as allegedly failing to comply with the enable requirement.

Claims 1-3, 6-7, 9, and 28-33 stand rejected under 35 U.S.C. § 112, second paragraph as allegedly being indefinite.

Claims 1-3, 6-7, 9, and 28-33 stand rejected under 35 U.S.C. § 112, second paragraph as allegedly "being incomplete for omitting essential steps in claim 1, such omission amounting to a gap between the steps." *Office Action* of October 14, 2008, p. 8.

Claims 1-3, 6-7, 9, and 28-33 stand rejected under 35 U.S.C. § 103(a) as allegedly being obvious over U.S. Patent No. 5,524,133 to Neale et al. ("Neale") in view of Gunther, et al., "Applicability of a simple parallel plate avalanche detector to photofission experiments," Nucl. Instrum. Methods, 163, 459-61 (1979) ("Gunther") and in further view of Groom, "Photon and electron interaction with matter," LBNL 152-53 (1998) ("Groom").

VII. ARGUMENT

A. Claims 1-3, 6-7, 9, and 28-33 satisfy the enablement requirement under 35 U.S.C. § 112, first paragraph.

Claims 1-3, 6-7, 9, and 28-33 are rejected under 35 U.S.C. § 112, first paragraph, as allegedly failing to comply with the enablement requirement. Specifically, the examiner alleges "identifying fissile material within an interrogated vessel" is not enabled in the specification, as filed. *See* Final Office Action, p. 7, 7th para. As explained in detail below, the current claims are supported by adequate written description.

1. The claims are enabled by the specification.

The Examiner has failed to meet his evidentiary burden with regard to the rejection because the rejection relies on limitations not found in the claims or the specification. *See* MPEP 2163.04. "All questions of enablement are evaluated against the claimed subject matter. The focus of the examination inquiry is whether everything within the scope of the claim is enabled." MPEP 2164.08 (citing *e.g.*, *AK Steel Corp. v. Sollac*, 344 F.3d 1234, 1244, 68 USPQ2d 1280, 1287 (Fed. Cir. 2003)).

In support of the rejection, and an associated objection to the specification, the Examiner states "said limitation requires enabling a method allowing distinguishing the fissile and non-fissile material within the same or very close atomic number." *Id.*, at p. 6, 5th para. But, "distinguishing a fissile material from a non-fissile material with a close atomic number" is not a limitation found anywhere in the claims. The Examiner has impermissibly read this limitation into the claims, despite the fact that this limitation is not found in the plain language of any of the claims. Thus, the enablement requirement only applies to "identifying fissile material within an interrogated vessel," which is accomplished, in part, by "determining a photon energy regime of the emerging photon beam through identification of a drop in photon yield in at least one of the three signals, the

determined photon energy regime identifying the fissile material within the interrogated vessel," as recited in claim 1.

a) The teachings of the specification.

The specification teaches "identifying fissile material within an interrogated vessel." For example, with reference to Figs. 1 and 6, the specification states that "In the presence of a radiological device composed of, for example, uranium, plutonium or neptunium concealed within the interrogated vessel 125, the measured spectrum from the beam flux monitor 130 reflects a precipitous drop in intensity between about 10 and 20 MeV." *Specification*, para. [0042]. The specification goes on to state that "The radiological material selectively absorbs the photon beam within its energy regime." *Id.* Thus, the specification enables "identifying fissile material within an interrogated vessel."

Not only does the specification enable the function of "identifying fissile material within an interrogated vessel," it also provides multiple examples of structural embodiments suitable for "identifying fissile material within an interrogated vessel." For example, the specification states:

> The **PPAD 200 may be tuned to uranium by having the target 210 made of, for example, a thin film of ^{238}U deposited on one side of an approximately 100 μm thick aluminum foil.** The target **210** may also be, for example, an approximately 178 micron thick film of ^{238}U. In one embodiment, the invention includes using targets **210** of different materials to tune the PPAD **200** to a corresponding range of energies. **The ability to tune the PPAD 200 allows detection of materials of varying atomic numbers.**

Specification, para. [0032] (emphasis added). This portion of the specification enables one of ordinary skill in the art to "identify fissile material within an interrogated vessel" by tuning the PPAD 200 to allow detection of materials of varying atomic numbers, including uranium. *Id.* The specification provides a further embodiment of a device for "identifying fissile material within an interrogated vessel," stating:

> Still referring to FIG. 1, the array of fission-fragment detectors (PPADs) 135 may be ionization detectors that operate in the avalanche regime, which is defined by a combination of gas pressure and electric field such that a single free electron can start an exponential ionization process. Typical gas pressures vary from 1 Torr to about 25 Torr, while the corresponding electric field varies from about 100 V/mm to 400 V/mm. **The array of fission-fragment detectors 135 may be tuned to the photofission cross section of the fissile material to be interrogated in container 125. In one embodiment, the array of fission-fragment detectors 135 is sensitive to photon energies in the range of about 10 to 20 MeV.** In other embodiments, a different range of energies may be desirable.

Specification, para. [0029] (emphasis added). This portion of the specification enables one of ordinary skill in the art to "identify fissile material within an interrogated vessel" by providing fission-fragment detectors comprising ionization detectors which may be tuned to the photofission cross section of the fissile material to be interrogated in a container.

b) In re Zeltz

The 1989 Federal Circuit decision in *In re Zeltz* supports Appellant's position. 893 F.2d 319, 13 USPQ2d 1320 (Fed. Cir. 1989). In *Zeltz* the court held

that "it was incorrect for the Board to read unwritten limitations into claims 13 and 14, limitations contrary to the plain words of the claims, and contrary to the interpretation that the inventor himself placed on the claims." *Id.* at 322. In *Zeltz* the Examiner and the Board interpreted the claims reading "normally solid polypropylene" and "normally solid polypropylene having a crystalline polypropylene content," respectively, as being limited to "normally solid linear high homopolymers of propylene which have a crystalline polypropylene content." *See* MPEP 2111.01(II). The court held that "The Board erred in holding that claims 13 and 14 must be read to include all the limitations of the lost count." *Zeltz*, at 322. In essence, "The court ruled that limitations, not present in the claims, were improperly imported from the specification." MPEP at 2111.01(II).

The rejections made by the Examiner in this case are similar to those made in *Zeltz*, with one primary difference. In *Zeltz*, the limitations read into the claims could at least be found in the specification. In this case, the limitations added by the Examiner are not even found in the Appellant's own specification. Claim 1 recites "A method for identifying fissile material within an interrogated vessel," however, the Examiner states that "said limitation requires enabling a method allowing distinguishing the fissile and non-fissile material within the same or very close atomic number." Final Office Action, at p. 6, 5th para. This added limitation is not found anywhere in the claims or in the specification, and as Appellant has

repeatedly pointed out to the Examiner, is incorrect and, apparently, based on the Examiner's erroneous personal opinion. *See, e.g.,* Response to Office Action of July 11, 2008, pp. 10-11. Similarly, it would be improper to require the Appellant to provide an enabling disclosure for an limitation that is found nowhere in the claims or the specification.

2. Conclusion

The cited sections of the specification in combination with the figures and other description in the specification are sufficient to enable one skilled in the art to perform a method for "identifying a fissile material within an interrogated vessel." Appellant, therefore, requests reversal of this rejection.

B. Claims 1-3, 6-7, 9, and 28-33 are not indefinite under 35 U.S.C. § 112, second paragraph.

Claims 1-3, 6-7, 9, and 28-33 are rejected under 35 U.S.C. § 112, second paragraph, as allegedly being indefinite. The Examiner has not met his burden with respect to this rejection, because he has not provided any articulable basis for the rejection. Moreover, the claims are not indefinite.

1. No articulated basis for the rejection.

The Examiner states that the claims are rejected for allegedly "failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention for the reasons set forth in section 5 and 7 above, because

the metes and bounds of the limitation 'identifying fissile material within an interrogated vessel' have not been set forth." Final Office Action, p. 8, para. 9. However, sections 5 and 7, upon which the Examiner relies for a basis for this rejection, refer only to enablement.

The Examiner attempted to respond to Appellant's arguments with regard to indefiniteness, preparing to cite MPEP 2111.01, but left the thought incomplete. That is likely because MPEP 2111.01 directly contradicts the Examiner's position. MPEP 2111.01 states that "it is improper to import claim limitations from the specification" and that "the words of a claim must be given their 'plain meaning' unless such a meaning is inconsistent with the specification." MPEP 2111.01 (citing *In re Zeltz, supra*; and *Superguid Corp. v. DirecTV Enterprises, Inc.*, 358 F.3d 870, 69 USPQ2d 1801 (Fed. Cir. 2004)).

2. Conclusion

The Examiner has not met his burden for establishing a *prima facie* case of indefiniteness, and the Appellant should not be required to guess as to the substance of the rejection. Therefore, the Appellant request reversal of the rejection.

C. Claims 1-3, 6-7, 9, and 28-33 are not incomplete under 35 U.S.C. § 112, second paragraph.

Claims 1-3, 6-7, 9, and 28-33 are rejected under 35 U.S.C. § 112, second paragraph, as allegedly being incomplete for omitting essential steps in claim 1, such omission amounting to a gap between the steps. Specifically, the Examiner states that the missing steps is "distinguishing the fissile and non-fissile material with the same or very close atomic number." As stated above, with reference to the enablement rejection, this element has been impermissibly added by the Examiner, and is found nowhere in the Appellant's claims or specification.

The Examiner relies on MPEP § 2172.01 for support, which states "A claim which omits matter disclosed to be essential to the invention as described in the specification or in other statements of record may be rejected under 35 U.S.C. 112, first paragraph, as not enabling." MPEP 2172.01 (citing *In re Mayhew*, 527 F.2d 1229, 188 USPQ 356 (CCPA 1976)) (emphasis added). The MPEP further states "In addition, a claim which fails to interrelate essential elements of the invention as defined by applicant(s) in the specification may be rejected under 35 U.S.C. 112, second paragraph, for failure to point out and distinctly claim the invention." MPEP 2172.01 (citing *In re Venezia*, 530 F.2d 956, 189 USPQ 149 (CCPA 1976); *In re Collier*, 397 F.2d 1003, 158 USPQ 266 (CCPA 1968)).

The rejection is improper for several reasons. First, the allegedly essential step is not present in the specification or in other statements of record. Indeed, the Appellant has repeatedly directed the Examiner's attention to the specification, argued that the inclusion of such limitations in impermissible, and requested that the Examiner refrain from unfounded speculation about what the invention is or is not and to refrain from reading elements into the claims which are not found in the plain language of the claims or the specification. *See, e.g.,* Response of July 11, 2008 at pp. 10-11.

Second, the specification and other statements of record do not disclose these elements to be essential to the invention. The elements described in the Office Action appear to be fabricated, or extrapolated from Examiner's personal knowledge. The rejection is improper because the standard for the rejection is based on those elements "disclosed to be essential to the invention as described in the specification or in other statements of record." MPEP 2172.01. Stated in other words, the rejection is only properly founded in those elements which the inventor himself admits to being essential to the claim. *See Id.* To the best of Appellant's knowledge, only statements to the contrary have been made. Therefore, the rejection under 35 U.S.C. § 112, second paragraph is improper and, and the Appellant requests reversal of the rejection.

D. The rejections under 35 U.S.C. § 103(a) are factually and legally unsupported.

Claims 1-3, 6, 7, 9 and 28-33 were rejected under 35 U.S.C. §103(a) as being unpatentable over Neale in view of Gunther and further in view of Groom.

1. Claims 1-2, 6-7, 9, and 28-33 are not obvious.

To render a claim unpatentable under 35 U.S.C. § 103, all the claim limitations must be taught by the prior art, M.P.E.P. § 2143.03. Moreover, the Examiner must provide analysis supporting any rationale why a person skilled in the art would combine the prior art to arrive at the claimed invention, and "[such] analysis should be made explicit," *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S.____ (2007). The Examiner bears the initial burden of factually supporting any *prima facie* conclusion of obviousness, M.P.E.P. § 2142; *In re Peehs*, 204 U.S.P.Q. 835, 837 (CCPA 1980). As the applied art does not meet all the claim limitations and the Examiner has not provided proper analysis supporting rationale why a person skilled in the art would have combined the applied art to arrive at the claimed invention, a *prima facie* case of obviousness has not been established with respect to the present claims.

2. Neale does not teach or suggest features of the claims.

Neale is directed to a method and apparatus for detecting the mean atomic number of a mass of material by subjecting the material to two groups of X-rays:

lower-energy X-rays and higher-energy X-rays. *See* Neale, Abstract. Neale defines the mean number of lower-energy X-rays transmitted through the material as N_A and the mean number of the higher-energy X-rays transmitted through the material as N_B. *See* Neale, Abstract; column 2, lines 5-23. Neale then computes the ratio of N_A/N_B and uses a lookup table to find the average atomic number of the material, based on the ratio. *See* Neale, Abstract; column 2, lines 5-23.

Neale does not teach or suggest the use of the three distinct, claimed detection components of amended claim 1: (1) an array of fission-fragment detectors, (2) a first set of scintillator paddles, and (3) a second set of scintillator paddles. Neale describes a thin crystal followed by a low-Z beam hardener followed by a series of high-Z converters that alternate with and are sandwiched by thin crystals. *See* column 3, lines 48-58. The affidavit from Dr. Philip Cole, included in Exhibit 1, describes several reasons why the system described by Neale does not teach or suggest these elements of claim 1, and further describes why claim 1 is not merely a predictable variation of the system taught by Neale.

Neale also fails to teach or suggest the claimed data analysis techniques of claim 1: obtaining separate signals for each of the distinct detection components and determining an energy regime through identification of a drop in photon yield in at least one of those signals so that one can ultimately identify the fissile material. Instead, as discussed above, Neale teaches a completely different

technique: Neale describes determining the ratio N_A/N_B (from two X-ray energy groups) and then using a lookup table to correlate to a specific atomic number. *See* Abstract; column 2, lines 5-23.

The Examiner points to element 22 in Figure 4 of Neale as meeting claim limitations involving the three claimed detection components and the claimed energy ranges. *See* Final Office Action at page 10. This characterization of Neale finds no support and is incorrect. Element 22 of Neale is simply described as a "detector." *See* Neale, column 11, line 8. Mentioning a generic detector cannot be found to amount to a disclosure or teaching of the specific and distinct three detection components recited in amended claim 1. Nor does this detector of Neale implicate the specific data analysis techniques recited in amended claim 1.

The Examiner also characterizes Neale as involving fissile material (*see* Final Office Action page 10), yet Neale nowhere mentions fissile material (unlike present, amended claim 1). Furthermore, Neale fails to teach or suggest atomic numbers beyond Z=14 (silicon), whereas embodiments of the present application encompassed by the claims are sensitive to Uranium and other high-Z material.

Additionally, Neale fails to teach or suggest an array of fission-fragment detectors, a first set of scintillator paddles, and a second set of scintillator paddles arranged sequentially in a direct path of an emerging photon beam such that each receives the emerging photon beam. Neale, as describe above, involves a distinct

concept altogether, and moreover, it appears that a beam may stop in a detector of Neale (preventing any sequential detectors from receiving it), through its particular use of heavy leaded crystals.

As described below, the significant legal and factual shortcomings of Neale are not cured by the secondary references cited by the Office and Applicant therefore respectfully submits that the claims are currently in condition for allowance.

3. Gunther does not teach or suggest features of the claims.

Gunther is cited as teaching or suggesting the inclusion of a PPAD detector into the device of Neale. As implicitly recognized by the Examiner, Gunther lacks any teaching or suggestion concerning the three detection components and/or the data analysis techniques argued above. Additionally, Gunther fails to teach or suggest an array of fission-fragment detectors, a first set of scintillator paddles, and a second set of scintillator paddles arranged sequentially in a direct path of an emerging photon beam such that each receives the emerging photon beam. Accordingly, even through combination with Gunther, Neale still does not include the elements of amended claim 1, which are argued above.

4. The combination of Neale and Gunther would fundamentally change the principle of operation of Neale.

"If the Proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious." MPEP 2143.01(VI) (citing *In re. Ratti*, 270 F.2d 810, 123 USPQ2d 349 (CCPA 1959)).

A combination of Gunther with Neale would fundamentally change the principle of operation of Neale, meaning obviousness is not established pursuant to MPEP 2143.01. Specifically, as mentioned above, Neale is directed to a technique that takes a ratio involving **two** X-ray energy regimes. A lookup table then correlates that specific ratio to an atomic number. Inclusion of a PPAD would add at least one other variable beyond the two needed to calculate the ratio N_A/N_B taught by Neale and would require a different data analysis technique altogether, nowhere taught or suggested by Neale or Gunter (or Groom, discussed below). Therefore, a *prima facie* case of obviousness cannot be established through a combination of Neale and Gunther.

5. Groom does not teach or suggest features of the claims.

It appears that the Examiner cited Groom in an attempt to show that one would have combined the cited references; however Groom fails to teaches or

suggests the claim elements argued above. Groom does not suggest that one should, or could, utilize the specific detection setup and data analysis techniques presently claimed in amended claim 1, nor does the Examiner suggest otherwise. Groom's failure to aid in an obviousness position is further highlighted by Neale's clear requirement that **two** X-ray energy regimes be used to form a **ratio** (N_A/N_B) that is then used with a lookup table to determine an atomic number. Thus, even in combination with Groom and/or Gunther, Neale does not render obvious the specific, claimed technique that uses three detector components along with specific data analysis techniques. Likewise, the references in combination do not render obvious the features concerning the array of fission-fragment detectors, the first set of scintillator paddles, and the second set of scintillator paddles arranged sequentially in a direct path of an emerging photon beam such that each receives the emerging photon beam.

6. Examiner's personal knowledge.

On pages 11 and 12 of the Final Office Action, the Examiner states:

> The X-ray detectors may be crystals of zinc tungstate or cadmium tungstate in which event the X-ray photons are converted by the crystals into electromagnetic radiation in the visible range and the photons of visible light can be detected and quantified using a photo-electric sensor adapted to generate from the light emitted from the crystal an electric current which can be measured to give a numerical value proportional to the X-ray photon population incident on the appropriate crystal. ***As well known in the art of high energy photon detection*** (see for example Groom Fig. 24.1) the photon attenuation

> length for photons with energy up to 50 MeV is below 100g/cm^2 and it is less than for photons with energy 5MeV in a high atomic number Z material. Therefore design (thickness) of **rarer crystal** detector is enough for absorption and detection of photons with energy **up to 50 MeV**. Neale's detectors is capable to detect photon beam within an energy range from about 1MeV to about 50 MeV, which meets claim limitation.

Office Action, April 16, 2008, pp. 11-12. This proposed adaption is not found in Neile, Gunther, or Groom. The Office Action includes several similar statements on page 13, each statement starting with the words "there is a common knowledge that." Applicant believes that the Examiner has either relied on personal knowledge, or taken Official Notice, with respect to this matter.

a) Examiner failed to assert official notice.

Despite the fact that the Examiner failed to take Official Notice for personal opinions, the rejection took the form of a rejection based on Official Notice. Consequently, the Appellant pointed out that facts for which Official Notice is taken serve to fill the gaps which might exist in the evidentiary showing and should not comprise the principle evidence upon which a rejection is based, M.P.E.P 2144.03, citing *In re Ahlert*, 165 U.S.P.Q. 418, 420-421 (CCPA 1970).

The Appellant knows of no reference that teaches "detecting an emerging photon beam within an energy range from about 1 MeV to about 50 MeV from the fissile material with an array of fission-fragment detectors, a first set of scintillator paddles, and a second set of scintillator paddles, wherein the array of fission-

fragment detectors, the first set of scintillator paddles, and the second set of scintillator paddles are sensitive to different ranges of photon beam energy," as claimed by claim 1, or any of the other statements of alleged "common knowledge." Therefore, Applicant believes that the features are not capable of instant and unquestionable demonstration as being well-known, as required of Official Notice by M.P.E.P. §2144.03(A), citing *In re Ahlert*, 424 F.2d 1088, 1091, 165 USPQ 418, 420 (CCPA 1970). Thus, the Appellant requested production of evidentiary proof by the Examiner. The Examiner did not make the production.

b) Examiner failed to produce requested evidentiary documents.

In accordance with Rule 37 C.F.R. §1.104(d)(2), the Appellant requested that the Examiner provide and make of record an affidavit setting forth his data as specifically as possible for the assertion. Response to Office Action July 11, 2008, p. 21. The Appellant requested, in the alternative, that the Examiner cite a reference in support of the assertion in accordance with M.P.E.P. §2144.03. However, the Examiner failed to produce either document. *Id.* Therefore, the Appellant requests that the Board ignore unsubstantiated statements of personal opinion made by the Examiner on pages 11-14 of the Final Office Action.

7. No reason to combine references to arrive at claimed subject matter.

Although the Office action alleges that there is reason to combine found in the cited references, Applicant respectfully disagrees.

"Rejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness." *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S.____ (2007). Significantly, in the current case, Examiner has not asserted "the simple substitution of one known element for another . . . [therefore] it will be necessary for [the Examiner] to look to interrelated teachings . . . the effects of demands known to the design community or present in the marketplace; and the background knowledge possessed by a person having ordinary skill in the art, all in order to determine whether there was an apparent reason to combine the known elements . . . ." *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S.____ (2007). In the Office Action, Examiner has not provided any analysis supporting any rationale why a person skilled in the art would combine Neale, Gunther and Groom to arrive at the method in claim 1. As the Supreme Court held, "[such] analysis should be made explicit." *Id.* Without this analysis, Examiner has not discharged the burden of establishing a prima facie case of obviousness of claim 1.

Since the references fail to teach or suggest every element of claim 1, it is not possible for the references to provide reason to combine in a way that would lead one of ordinary skill in the art to arrive at the method of claim 1. Specifically, as set forth above, none of the references teach or suggest "detecting an emerging photon beam within an energy range from about 1 MeV to about 50 MeV from the fissile material with an array of fission-fragment detectors, a first set of scintillator paddles, and a second set of scintillator paddles, wherein the array of fission-fragment detectors, the first set of scintillator paddles, and the second set of scintillator paddles are sensitive to different ranges of photon beam energy," nor do any of the references teach or suggest "determining a photon energy regime of the emerging photon beam through identification of a drop in photon yield in at least one of the three signals, the determined photon energy regime identifying the fissile material" as recited in claim 1. Indeed, none of the references even hints at detecting an emerging photon beam within the energy range from about 1 MeV to about 50 MeV. Therefore, the references also fail to teach or suggest any reason to combine references to arrive at the method of claim 1.

Applicant asserts that the statement of reason found on pp. 13-14 of the Final Office Action is conclusory and incorrect. Final Office Action, p. 14.

First, the Office Action quotes a line from Neale which states that "Material discrimination arises from the energy dependence of the transmission coefficient

being different from different materials." *Id.* (citing Neale, column 8, lines 7+). Although this assertion describes the field of X-ray imaging generally, it is effectively irrelevant with respect to reason to combine Neale with Gunther and Groom, because it has nothing specifically to do with the method of claim 1.

Next the Office Action paraphrases a section of the MPEP to provide a general ground for an appropriate showing of reason, but fails to apply those grounds to the cited references or the subject matter of claim 1.

Finally, the Office action states "The alleged distinction between the claimed 'method for identifying fission material' of the invention and cited prior art does not correspond to any non-obvious claimed limitation. Applicant's method uses the same steps as in prior arts. Apparatus disclosed by prior Arts combination is capable to perform the Applicant's method." Not only is this statement merely conclusive, unfounded in any logical reasoning, it is also erroneous. The method of claim 1 does not use the same steps as any methods either taught or suggested in the prior art separately or in combination. Therefore, Applicant asserts that the Office has failed to make a proper showing of reason to combine Neale with Gunther and Groom to arrive at the method of claim 1 and therefore failed to meet its burden of establishing a prima facie case of obviousness of claim 1.

Further, the combination of these references is not proper, given the Supreme Court's *KSR* decision. For example, the argued combinations would

fundamentally change the operating principles of Neale. Stated differently, it can be said that Neale *teaches away* from the Office's proposed combinations because those combinations (*e.g.*, adding a PPAD) would destroy or modify Neale's technique of looking up atomic numbers by simply using two calculated values N_A and N_B that are based on interrogation by two different X-ray energy regimes.

Any arguments that it would have been obvious to fundamentally change both the detection hardware (Neale does not use the three separate detection components claimed), data analysis techniques (Neale uses a completely different ratio/lookup table analysis), and arrangement of physical components (e.g., to sequentially arrange specific components) to match claim 1 would amount to impermissible hindsight that is not supported by any of the cited references and which does not establish obviousness pursuant to MPEP 2145.

8. Conclusion

In view of the above, claims 1-3, 6-7, 9, and 28-33 are nonobvious over Neale in view of Gunther in further view of Groom. Appellant, therefore, requests the reversal of this rejection.

Respectfully submitted,

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Date: March 16, 2009

VIII. CLAIMS APPENDIX

1. A method for identifying fissile material within an interrogated vessel, comprising:

casting an incident photon beam from an electron beam accelerator through the interrogated vessel on the fissile material;

detecting an emerging photon beam within an energy range from about 1 MeV to about 50 MeV from the fissile material with an array of fission-fragment detectors, a first set of scintillator paddles, and a second set of scintillator paddles, wherein the array of fission-fragment detectors, the first set of scintillator paddles, and the second set of scintillator paddles (a) are arranged sequentially in a direct path of the emerging photon beam such that each receives the emerging photon beam, and (b) are sensitive to different ranges of photon beam energy;

obtaining a first signal from the array of fission-fragment detectors, a second signal from the first set of scintillator paddles, and a third signal from the second set of scintillator paddles, each signal indicative of photon yield within the different ranges of photon beam energy; and

determining a photon energy regime of the emerging photon beam through identification of a drop in photon yield in at least one of the three signals, the determined photon energy regime identifying the fissile material within the interrogated vessel.

2. The method of claim 1, wherein said identifying comprises determining a range of an atomic number of a material in a container.

3. The method of claim 1, wherein detecting the emerging photon beam from the material with the array of fission-fragment detectors comprises detecting an energy range of the emerging photon beam in a range between about 10 MeV to 20 MeV.

6. The method of claim 1, wherein detecting the emerging photon beam from the material with the first set of scintillator paddles comprises detecting an energy range of the emerging photon beam in a range up to about 6 MeV.

7. The method of claim 1, wherein detecting the emerging photon beam from the material with the second set of scintillator paddles comprises detecting an energy range of the emerging photon beam exceeding about 6 MeV.

9. The method of claim 1, further comprising creating a photon distribution energy curve using a combination of the first signal from the array of fission-fragment detectors, the second signal from the first set of scintillator paddles, and the third signal from the second set of scintillator paddles.

28. The method of claim 1, wherein casting an incident photon beam from the electron beam accelerator comprises directing an electron beam onto a radiator for producing a photon beam through bremsstrahlung process.

29. The method of claim 1, further comprising producing electron positron pairs with a convertor coupled to the second set of scintillator paddles.

30. The method of claim 29, further comprising detecting an energy range of the electron positron pairs exceeding about 6 MeV.

31. The method of claim 1, wherein the array of fission fragment detectors is sensitive to a range of photon beam energy between about 10 MeV and 20 MeV, the first set of scintillator paddles is sensitive to a range of photon beam energy up to about 6 MeV, and the second set of scintillator paddles is sensitive to a range of photon beam energy above about 6 MeV.

32. The method of claim 31, wherein the first and second set of scintillator paddles comprise plastic scintillator paddles.

33. The method of claim 1, wherein the array of fission fragment detectors, the first set of scintillator paddles, and the second set of scintillator paddles are sensitive to different, but overlapping ranges of photon beam energy.

IX. EVIDENCE APPENDIX

Exhibit 1 – Declaration of Dr. Philip L. Cole under 37 C.F.R. 1.132 filed on July 11, 2008.

X. RELATED PROCEEDINGS APPENDIX

None

EXHIBIT 1

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: Philip L. Cole	Group Art Unit: 3663
Serial No.: 10/694,624	Examiner: Dudnikov, Vadim
Filed: October 27, 2003	Atty. Dkt. No.: COPL:002US
For: REMOTE SENSING DEVICE TO DETECT MATERIALS OF VARYING ATOMIC NUMBERS	

DECLARATION OF DR. PHILIP L. COLE UNDER 37 C.F.R. §1.132

Commissioner for Patents
PO Box 1450
Alexandria, VA 22313-1450

I, Philip L. Cole, do hereby declare that:

1. I am an Associate Professor of Physics in the Department of Physics at Idaho State University and am a Research Associate at the Idaho Accelerator Center in Pocatello, Idaho. I have over twenty years of research experience in the area of nuclear and particle physics. I am the inventor and the applicant associated with U.S. Patent Application serial number 10/694,624, filed on October 27, 2003 ("application"). I have a financial stake in the application and any resulting patent.

2. I have reviewed the Office Action dated April 16, 2008. According to my understanding, the Office Action rejects Claims 1-3, 6, 7, 9, and 28-33 under 35 U.S.C. § 103(a) based

on the combination of U.S. Patent No. 5,524,133 to Neale ("Neale") in view of Günther et al., *Applicability of a Simple Parallel Plate Avalanche Detector to Photofission Experiments*, Nucl. Instrum. Methods, 163, 459-461 (1979) ("Günther"), and in view of Groom, *Photon and Electron Interaction with Matter*, LBNL, 152-53 (1998) ("Groom"). I disagree with the rejection of the claims based on the cited combination.

3. I have reviewed the Neale reference, and according to my understanding, Neale teaches using Zinc Tungstate or Cadmium Tungstate crystal detectors to detect an X-ray beam generated by a linear accelerator. (*Neale*, column 10, lines 24-65). Neale teaches detecting photons in the energy ranges of 10 keV-200 keV and 1 MeV-10 MeV. (*Neale*, Figs. 1-3; column 9 lines 40-45; column 10, lines 25-40). I do not believe that Neale teaches or suggests a method or system for "detecting an emerging photon beam within an energy range from about 1 MeV to about 50 MeV with an array of fission-fragment detectors, a first set of scintillator paddles, and a second set of scintillator paddles, wherein the array of fission-fragment detectors, the first set of scintillator paddles, and the second set of scintillator paddles (a) are arranged sequentially in a direct path of the emerging photon beam such that each receives the emerging photon beam, and (b) are sensitive to different ranges of photon beam energy," as described in claim 1.

4. The crystal detector taught by Neale is not capable of sustaining high photon fluxes of 10^7 photons per second (10 MHz). These crystals have a relatively long decay time of about 24 microseconds for Zinc Tungstate and 13 microseconds for Cadmium Tungstate, as compared with the 1 to 3 nanoseconds for organic plastic scintillators paddles. More specifically, these crystals cannot detect photon energies at the rates necessary to detect a

direct pulsed photon beam from a standard electron accelerator at the energy levels of between 1 MeV and 50 MeV. Therefore, the crystal detectors of Neale are not structural or functional equivalents of the array of fission fragment detectors, the first scintillator paddles and the second scintillator paddles of claim 1.

5. The crystals taught by Neale cannot be placed directly in the path of the emerging photon beam and hence could not be used in the method described in claim 1, because the Cadmium Tungstate and Zinc Tungstate crystals in Neale cannot sustain high photon rates above 100 kHz (10^5 photons per second).

6. Presently, according to my understanding, the size of these crystals taught by Neale cannot be manufactured beyond about 10 cm in diameter. They are therefore limited in size as compared to the scintillator paddles and the fission fragment detectors of claim 1.

7. The maximum energy of the bremsstrahlung photons is generally predicated upon the energy of the electron beam. Since Neale uses a maximum of 10 MeV electrons from an accelerator, the photon energy in the system taught by Neale could not exceed 10 MeV. (*Neale*, Figs. 1 and 3; column 10, lines 23-30). Therefore, Neale does not teach or suggest a system or method that is capable of "detecting an emerging photon beam within an energy range from about 1 MeV to about 50 MeV" as described in claim 1, because the system taught by Neale is not capable of generating photon energies up to 50 MeV.

8. Neale requires two or more accelerators operating at two separate electron endpoint energies neither of which will operate above 10 MeV. These two accelerators operate at different energies, each below 10 MeV, to determine the relative ratio of the yield of

photons. The relative ratio, Na/Nb relating to the yield from accelerator a to that from accelerator b, is used to determine the mean atomic number of the probed material. Accordingly, the configuration taught by Neale cannot probe for elements beyond Z = 14 or silicon (*see Neale*, FIG. 2). Therefore, Neale does not teach or suggest a method for detecting fissile material as described in claim 1, because the system taught by Neale is not capable of detecting fissile material such as uranium or plutonium or even capable of detecting lead shielding.

9. Since Neale uses two or more accelerators, and crystal detectors which are only capable of detecting photon energies of 10 MeV and below, it would not have been predictable that an array of fission-fragment detectors, a first set of scintillator paddles, and a second set of scintillator paddles could be used to detect an emerging photon beam generated by a single accelerator within the energy range from about 1 MeV to about 50 MeV as described in claim 1. Furthermore, this type of modification would have made the system of Neale unsatisfactory for its intended purpose of determining a relative ratio, Na/Nb relating to the yield from accelerator a to that from accelerator b, to determine the mean atomic number of a probed material.

10. I hereby declare that all statements made herein of my knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

July 11, 2008
Date

Philip L. Cole
Philip L. Cole, Ph.D.